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1 November 1976

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EDITORIAL

AMSAT-OSCAR 8

In professional circles it is customary to call a spacecraft by one name prior to launch, and then give it its flight name after it leaves the ground. In the past we at AMSAT have also tried to keep to that custom. In the past when we were building one spacecraft at a time, it did not really matter if a spacecraft was called AMSAT-OSCAR B or AMSAT-OSCAR 7.

Following the announcement of the Phase III satellite program there has been a tendency to use OSCAR 8 and Phase III interchangeably. Again if only one spacecraft was in the works this would not really matter. But, now there are more than one spacecraft in the works. The launch of the FIRST Phase III spacecraft has slipped to about 1980. There is serious thought to a Phase II or AMSAT-OSCAR 6/7 follow on to replace AMSAT-OSCAR 6 and a lot of talk is coming from AMSAT-UK on the feasability of a 21/28 MHz transponder communications satellite, also in the Phase II series.

Thus at this time, no one is sure what AMSAT-OSCAR 8 will be, so let's refer to the spacecraft by the correct nomenclature.

REMEMBER TO VOTE

This is an election year, both in the USA and in AMSAT. AMSAT is in the middle of a transition phase. We are slowly making the transition from a small Washington based club with a few members outside our area, to a large International Organization with members all over the world.

The ballots that were published in the June Newsletter show that there are eight candidates standing for election to three seats on the Board of Directors, and three of those eight are not citizens of the USA. This should bring home the international aspect of our organization.

It is important that you vote. Your vote does count. It does not matter whom you vote for, as long as they are the candidates of your choice. If you have not yet done so, locate the June Newsletter, clip or copy the ballot form on Page 10, fill it in, place it in an envelope and write your membership number, name and zip code or country on the outside of the envelope. Then put that envelope inside another envelope and mail it in to Box 27; mail in your ballots even if you plan to come to the Annual Meeting. You can always recover it at the meeting in the event that you change your mind about your vote, and in the event that something comes up and you can't get to the meeting, your votes will still be counted.

A handy envelope is enclosed with this issue of the Newsletter, and while you are stuffing your ballot into the envolope you might also put in a cheque to cover your dues for 1977.

MICROPROCESSORS

The Navy-Marine Corps Mars Project is progressing and details should be available shortly. Those of you who sent in SASE's, don't worry about them. They are safe. They will be held until there is a definite announcement about the availability of hardware, and then mailed out with all the necessary information.

On the software side, a useful debug monitor was published in the September, 1976 issue of Byte magazine. This software has since been updated and will be made available to AMSAT members at the same time as the hardware.

(Continued on page 4)

FROM THE PRESIDENT'S DESK

by Perry Klein, K3JTE

With the rapid approach of the ITOS/NOAA meteorological satellite launch next year, it is clear that the AMSAT Phase III spacecraft will not be ready in time for launch. The AMSAT Board, therefore, has been taking a hard look at whether an AMSAT Phase II spacecraft (another of the AMSAT-OSCAR-B series) could be readied instead. We have already received approval from NASA to fly an amateur satellite with this NOAA mission.

Several AMSAT subsystems have been under development for possible use in such a "target of opportunity." These include:

- A 145.9-to-435.1 MHz four-watt linear transponder under development by members of the Japan AMSAT Association.
- A 15-to-10 meter transponder being developed by the AMSAT-UK construction group.
- A thick-film hybrid, printed circuit version of the two-to-ten meter transponder, a project of AMSAT-Canada.
- A "standardized" spacecraft structure and modules, being worked on by members of Project OSCAR in California.

Also available for such a project are a rechargeable Nickel-Cadmium battery, solar arrays, a spacecraft/launch vehicle interface fitting, and other possible hardware.

In addition, the IHU ("Integrated Housekeeping Unit") computer for the Phase III spacecraft has already been developed by AMSAT-Deutschland and, if repackaged, could be used to perform the command decoding, telemetry encoding, and experiment control logic functions in the spacecraft.

If we should go ahead with this satellite project, the mission would provide an excellent opportunity to test advanced Phase III concepts (although with a less advanced AMSAT-OSCAR-B series spacecraft). These include the IHU and its associated software development, and the gaining of practical experience in ground telecommand techniques and telemetry data-handling with the onboard IHU computer.

Perhaps even more important, the proposed mission provides "insurance" over the next several years in the event of a loss of AMSAT-OSCAR 6 or AMSAT-OSCAR 7. The AMSAT Board recognizes the importance of maintaining at least one satellite in operation at all times, to provide continuity to the radio amateur satellite program.

(Continued from page 3)

PHOTOGRAPHS

We are always in need of your photographs to publicize the AMSAT-OSCAR program. However, in order for the photographs to be of use, they must meet some standards as follows:

BLACK and WHITE: Photos of stations and operators, or antennas should be at least the 3½ inches by 5 inches size.

COLOUR SLIDES : Should be clear and show activities.

COLOUR PRINTS : Should be at least 3½ inches by 5 inches size.

All photographs should be accompanied by a brief caption or explanation.

The Black and White prints are placed in magazines as filler items. They are interested in photos of stations and operators with a brief description of the operations. Colour slides are useful for demonstrations and colour prints likewise. There are not many ham magazines publishing colour.

If you are interested in recording your station for posterity and helping out our publicity efforts, send in some pictures.

Joe Kasser

Joe Kasser, G3ZCZ

AN IMPRESSION OF ELLIPTICAL SATELLITE ORBIT TRACKS

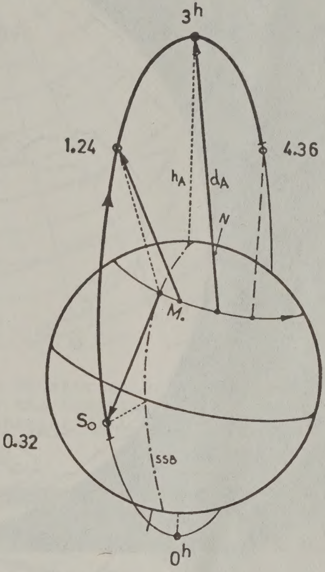
BY OTMAR K. POPP, DL3SX

The AMSAT Phase III Spacecraft are intended for elliptical orbits so as to achieve improved VHF contacts from continent to continent, with periods of 6, 8, or 12 hours under discussion. The real track will probably be somewhere in between, but as an example the 6 hours orbit will give a good impression of the differences between the orbits of AMSAT's OSCAR 6 and 7 and the Phase III orbit.

1. The 6 Hour Elliptical Orbit

Assuming the AMSAT-OSCAR-7 orbit as the original base, and the main loop towards the northern hemisphere, the new track will give (approximate values, see also Table 1):

-minimum height h	1,460 km
-maximum height	19,300 km
-minimum range r	3,950 km
-maximum range	8,400 km
-maximum distance between satellite and surface of the earth d'	24,900 km



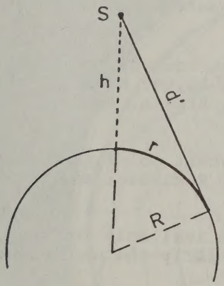


Fig. 2:

Typical positions on a 6 hrs orbit (schematic)

S_o = satellite crossing the equator
M = Munich (48° north)
h_A = height when in apogee
d_A = distance from Munich
SSB= sub-satellite track

The heavy drawn line shows the part usable for communication from Munich

Fig. 1:

R = earth radius
h = height of satellite S
d = distance
d'= max.distance
r = radius of covered area (range)

2. A Typical 6 Hour Orbit

Suppose the satellite is at its nearest point to the earth, the perigee, at midnight, and let it be thought that the subsatellite track is going through Munich at the moment when the satellite is crossing the equator (So in Figure 2).

As it moves towards the North, the satellite's height will steadily increase, and its speed along the track will steadily become less.

At half past midnight the satellite overflies Kisangani, Zaire, and has been above the horizon of Munich for about 5 minutes. Its height of 5,600 km (3,480 miles) means that radio communication will be possible within a range of 6,000 km (3,730 miles) of Kisangani.

Later on its route, it comes closest to Munich, and one hour after the equator crossing it overflies a latitude of 48 degrees north.

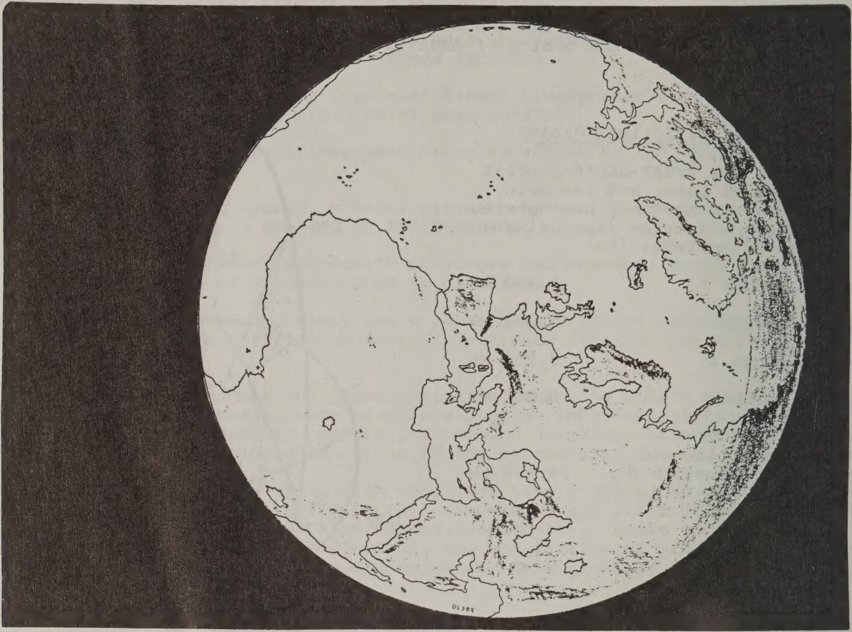


Figure 3: Satellite view from over Western Europe.

In the meantime, Munich has moved 13 degrees towards the East -- so the spacecraft is directly over the Bretagne, France, 14,000 km high (about 8,700 miles), and its range covers Trinidad, Haiti, Kansas, Alaska, Peking, and India. (See Figure 3)

At 3 o'clock, the satellite reaches its highest point, the apogee, and may be used by stations in Panama, Hawaii, Japan, Pakistan, and the north of Africa (Figure 5).

In a 12 hours orbit, not only will the time available for contacts be extended, but the satellite's range will also cover nearly the whole hemisphere.

Another example:

At half past midnight the spacecraft (S_o) is assumed to cross the equator above the Columbian Vaupes Province (70° West) 3,480 miles high. This allows contacts to be made from Cape Horn to Labrador, and from the Cape Verde Islands to Mexico.

At that instance the subsatellite track follows Haiti, Long Bay, Pittsburgh, Pa., Lakes Erie and Huron, and Cape Eskimo. Forty (40) minutes later, at 1.10 AM the satellite passes (40 degrees north) above Springfield, Ill.; the earth has turned 10 degrees towards the East. The altitude is 12,000 km (7,460 miles), enabling radio contacts to be made within 7,800 km (4,850 miles) from Springfield.

Two other ranges for possible radio communication are shown in Figure 4.

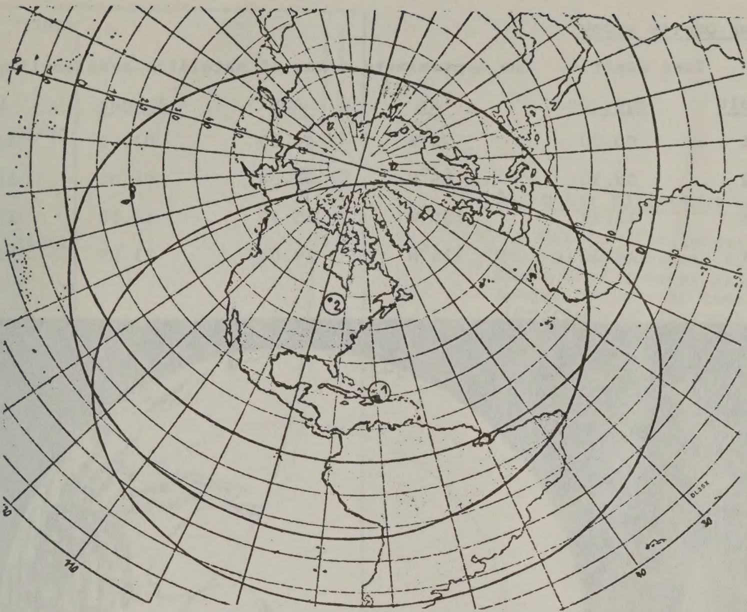


Figure 4: A 6 hour orbit and an equatorial crossing near 60° West, will put the satellite over the Dominican Republic ① and, half an hour later, over Lake Superior ②.

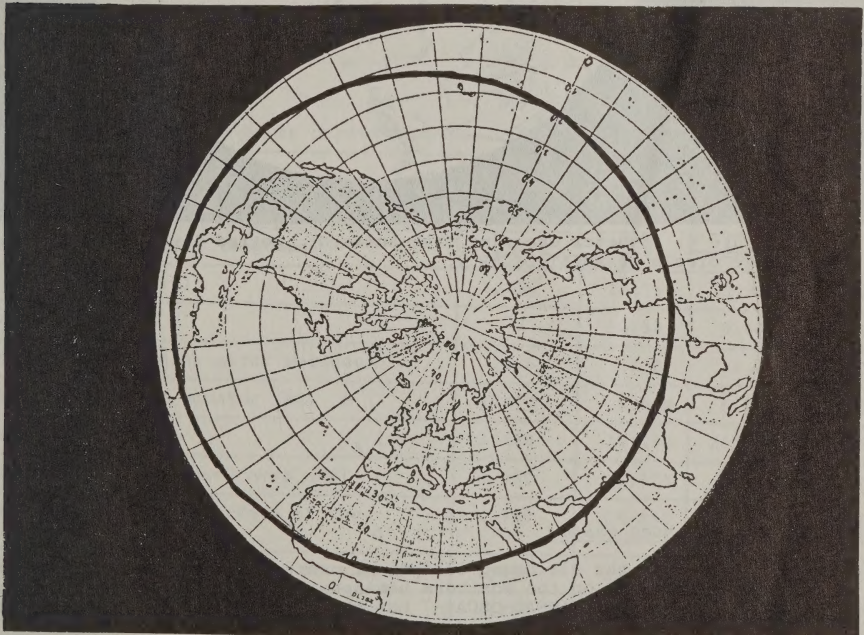


Figure 5: Area covered by a satellite at its apogee of a 6 hour orbit. (In a 12 hour orbit, nearly the whole hemisphere will be in range.)

3. Four Orbits a Day

Take Seattle. The approximate times of satellite availability will be:

Orbit	equ. cr.	at	AOS	Apogee	LOS
1	00.30	25°E	00.30	03.00	04.30
2	06.30	65°W	07.00	09.00	11.30
3	12.30	155°W	13.30	15.00	17.00
4	18.30	115°W	19.00	21.00	22.30

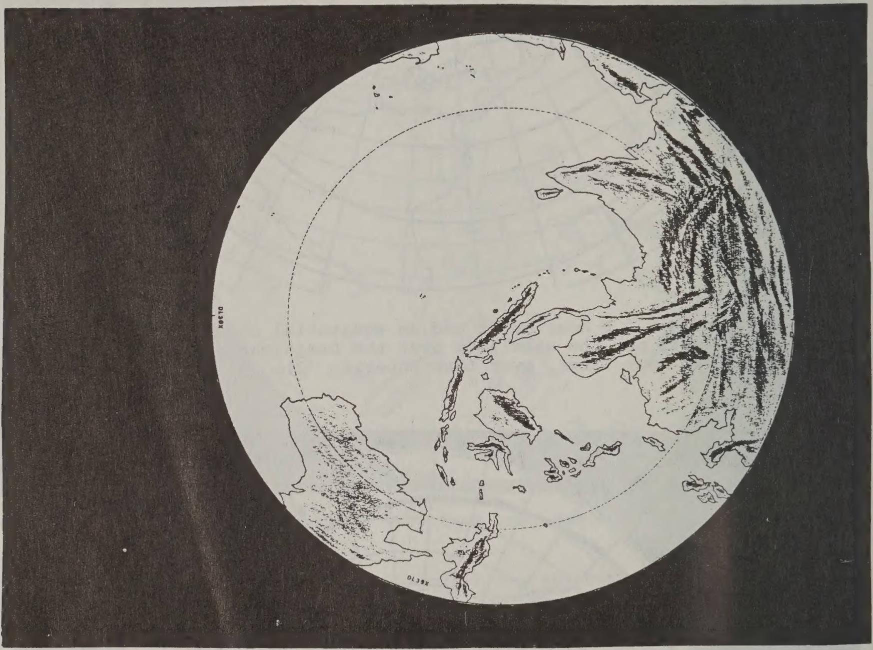
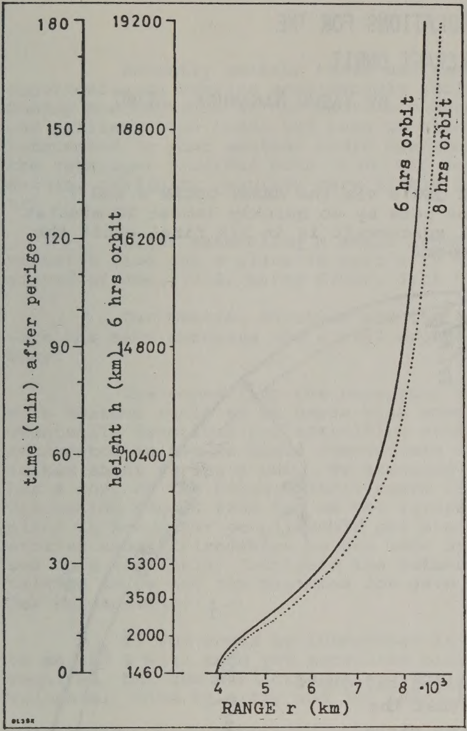


Figure 6: Equator Crossing over Sumatra. Dotted line traces out range circle of AMSAT-OSCAR 7.

4. Much Light Gives Much Shadow

Reflected onto the discussed elliptical orbit, the "shadow" will be felt by stations positioned on the southern hemisphere. Of course, there will be fewer usable orbits than with AMSAT-OSCAR-7 but the possible range will be improved. For example, when crossing the equator over Sumatra, the satellite will "see" Sydney, Madagaskar, Iran, and Irkutsk just at the horizon (figure 6).



5. Other Elliptical Orbits

Orbits with longer periods will allow contacts to take place over greater ranges for longer periods of time. A comparison of such orbits are given in Figure 7 and Table 1.

Figure 7:

Radius r of covered area and Height h (6 hours orbit) versus time after perigee.

Table 1:

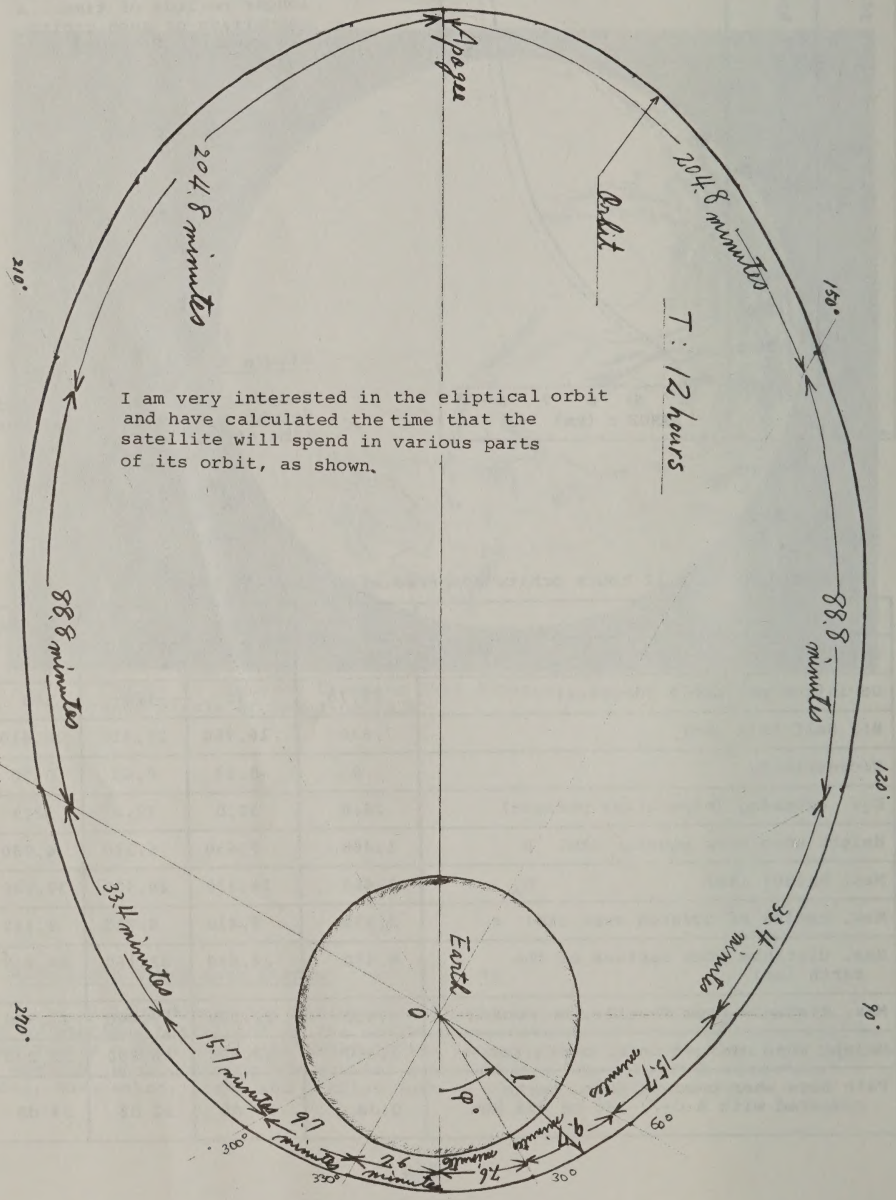
The 6, 8, and 12 hours orbits compared with AMSAT-OSCAR-7

Period	115 min	6 hrs	8 hrs	12 hrs
Orbits per day	12 ½	4	3	2
Deviation per orbit (degrees)	28,75	90	120	180
Big Half Axis (km)	7,830	16,760	20,310	26,610
Eccentricity	0	0,53	0,61	0,70
Equ. crossing (mins after perigee)	28,8	32,0	32,4	32,9
Height when over equator (km) h	1,460	5,630	6,270	6,980
Max. height (km) h_A	1,460	19,330	26,400	39,020
Max. radius of covered area (km) r	3,950	8,410	8,760	9,110
Max. distance from surface of the earth (km) d'	4,450	24,890	32,160	44,940
Max. distance from Seattle, or Munich	4,450	22,520	29,460	41,930
Height when over 48 degr. north (km)	1,460	13,800	16,900	22,200
Path Loss when over 48 degr. north compared with A-O-7, 146 or 435 MHz	0 dB	20 dB	22 dB	24 dB

SOME NUMERICAL CALCULATIONS FOR THE PHASE III SPACECRAFT ORBIT

BY YASUO NAKAMURA, JA2WO

It is nice to be able to make DX QSO's via the AMSAT-OSCAR 6 and 7 spacecraft but unfortunately the satellites pass by so quickly (about 20 minutes for an overhead pass). When the Phase III spacecraft is in its final orbit the access time on each orbit will be much longer.



I am very interested in the eliptical orbit and have calculated the time that the satellite will spend in various parts of its orbit, as shown.

AMSAT PUBLICITY

BY GARY TATER, W3HUC

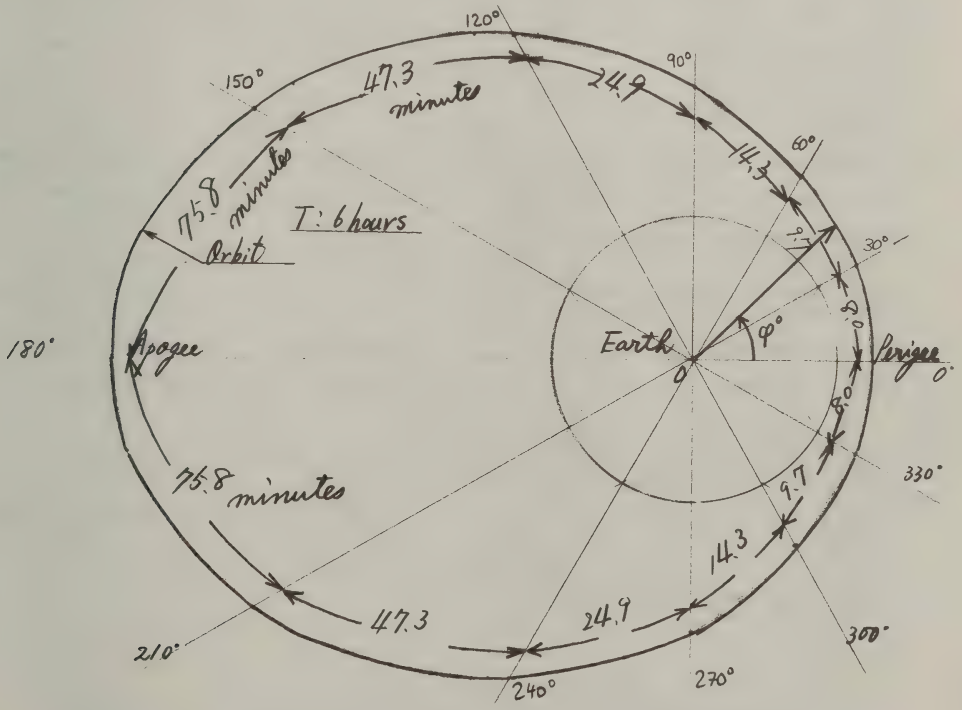
Recently amateur radio and particularily AMSAT were afforded the opportunity to receive considerable publicity by being spotlighted in The Sunday Sun Magazine of the Baltimore Sunday Sunpaper. As computer hobbyists and citizens band radio had been written about, we felt that people would be interested in what amateur radio operators were doing with satellites. Since the newspaper provided both a writer and a photographer, this technique of gaining publicity requires very little time and we hope other AMSAT members will try it.

After assembling a small group of AMSAT members willing to take part, we set a time and a place to meet with the newspaper people. Our group consisted of Joe G3ZCZ, Marty K2UBC, Jack W3TMZ and myself.

Our meeting location was the home of Jack W3TMZ which was ideal as Jack has many antennas and a well organized station to keep the photographer busy.

The young lady the newspaper sent to write the article was not familiar with amateur radio so we began with some basic facts about amateur radio and eventually described our activities with amateur satellites. She was particularly interested in how we could communicate with others using satellites and what we talked about during a QSO. We stressed the educational aspects of AMSAT and gave her a copy of the Science Involvement Circulum available from the ARRL. The discussion ranged from how we got interested in amateur satellites in the first place to how other people could get started in the hobby. Jack had several stories about friendships he had made by talking with amateurs via the satellites, and this especially intrigued the author. Between the notebook pages she filled talking to us and the pictures Joe gave her, she had plenty of information to use for her article.

If you would be interested in trying this venture in your area, write to me and I will send you satellite pictures. There is really very little work required, but the publicity gained for amateur radio and AMSAT would be very valuable. Give it a try and let AMSAT know about your results.



Report on AO-7 and AO-6 OVERLAP EXPERIMENTS During February 1976: Satellite-to Satellite and Relative Sensitivity Tests

by Raphael Soifer, K2QBW

Satellite-to-satellite experiments were conducted at various times during the week of February 1-7, 1976, using a varactor tripler transmitter at 432.15 MHz with power output of 15 W. and a Yagi antenna with estimated gain of 12 dBi. The ten-meter receiving antenna consisted of a 102-foot center-fed long wire, assumed to be omnidirectional at 29 MHz for purposes of link calculations.

No satellite-to-satellite signals from K2QBW were observed during any AO-6 orbit utilized for direct AO-6 communication by other stations, although certain other satellite-to-satellite signals from higher-power 432 MHz stations were heard. Calls included W2GN, W8DX, W5HN, W5VY, W4GSH, K2KNV, W9OII, WØEOZ, and YV5ZZ. K2QBW signals were heard during two orbits on February 3 when AO-6 was clear of direct stations. The first such was Orbit 15094 (AO-7 5567), with estimated satellite separation of 610 statute miles (980 km). No stations were worked, although observed S/N was on the order of 3 to 6 dB at 29.5 MHz. During Orbit 15102 (AO-7 5575), two-way satellite-to-satellite contacts were exchanged with WØEOZ, W4GSH and W2BXA, all transmitting on 432.15 MHz and being received on 29.5 MHz.

TABLE I. Satellite-to-Satellite Link Calculations

	Nominal	Observed or Deduced
K2QBW EIRP at 432.15 MHz		240 W. (54 dBm)
Slant range satellite-to-ground		2200 mi. (3700 km)
Path less ground-to-satellite at 432.15 MHz	160 dB	160 dB
Input signal power at AO-7	-106 dBm	-106 dBm
AO-7 power output at 145.95 MHz	2 W.	50 mW to 100 mW
Satellite separation	520 mi (830 km)	520 mi (830 km)
Satellite-to-satellite path loss at 145.95 MHz*	137 dB	137 dB
Input signal power at AO-6	-104 dBm	-120 dBm to -117 dBm
AO-6 power output at 29.5 MHz	380 mW	10 mW to 20 mW
Path loss satellite-to-ground at 29 MHz*	136 dB	136 dB
Input signal at ground with omnidirectional antenna	-110 dBm	-126 dBm to -123 dBm
Noise level at 500 Hz BW**	-129 dBm	-129 dBm
Output S/N Ratio	19 dB	3 dB to 6 dB
Satellite-to-ground path loss at 145.95 MHz (Mode B)*	150 dB	150 dB
Input signal at ground with 10 dBi antenna	-107 dBm	-123 dBm to -120 dBm
Noise level with 3 dB NF, 2 dB line loss, 300° antenna noise, 500 Hz BW	-141 dBm	-141 dBm
Output S/N Ratio	34 dB	18 dB to 21 dB

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*All path losses include 3 dB polarization mismatch.

**For assumptions see K2QBW paper in 1973 ARRL Technical Symposium Proceedings.

Observed S/N for K2QBW was also about 3 to 6 dB, and varied up to 10-12 dB for other stations of which the loudest was W4GSH.

Link calculations for the above experiment are shown in Table I. As may be seen, the observed S/N was considerably below what was predicted assuming that AO-7 was radiating a full 2 W. output. The difference of 13 to 16 dB is attributed to power-sharing loss in AO-7, since the power output of K2QBW at 432.15 MHz was considerably less than that of other stations using AO-7 at the same time. The majority of the power output was distributed to those stations, leaving no more than 50 to 100 mW for K2QBW. This conclusion is borne out by the observations made on 145.95 MHz simultaneously with the above test, in which the observed S/N of K2QBW's signal through AO-7 alone was on the order of 20 dB instead of the 34 dB which would have been predicted assuming the full 2 W. power output. These calculations are presented in the lower half of Table I. It is believed that the two-way contacts referred to above were the first to be reported using so little power at 432 MHz. Estimated satellite separation was 520 statute miles (830 km).

On February 8, a relative sensitivity test was conducted between AO-6 and AO-7, Mode A, during Orbits 15164 and 5637, respectively. The satellite separation was approximately 600 statute miles (1000 km); the azimuth bearings to each satellite were at no time more than 15 degrees apart and the maximum elevation angle to either satellite was no more than 20 degrees. Both satellites experienced moderate loading, with approximately ten to twenty stations at a time.

The available output power from K2QBW at 145.95 MHz was approximately 500 W. EIRP with switch-selectable horizontal or vertical polarization; the ten-meter receiving antenna was the same as used above. Link calculations for both satellites are presented in Table II. The observed S/N of 15 to 20 dB using AO-6 compares reasonably with the nominal predicted value of 23 dB, the difference being attributable to power-sharing. However, AO-7 exhibited results which were consistently 10 dB below those of AO-6, under identical power-sharing conditions. This differential held true regardless of antenna polarization. During this experiment, two-way contacts were exchanged with WA4AOR, W0II, VE5XU and K1HTV. No attempt was made to compare precisely the downlink signals of those stations, since their uplink polarizations could not be switched by the receiving operator; however, their downlink signals roughly agreed with the results obtained by K2QBW.

TABLE II. Sensitivity Test Link Calculations

	Nominal	Observed or Deduced
K2QBW EIRP at 145.95 MHz		500 W. (57 dBm)
Slant range satellite-to-ground		2200 mi (3700 km)
Path loss ground-to-satellite at 145.95 MHz	150 dB	150 dB
Input signal power to AO-6 and AO-7	-93 dBm	-93 dBm
AO-6 power output at 29.5 MHz	1 W	160 mW to 500 mW
AO-7 power output at 29.5 MHz	1 W	16 mW to 50 mW
Path loss satellite-to-ground at 29.5 MHz*	136 dB	136 dB
AO-6 input signal at ground with omnidirectional antenna	-106 dBm	-114 dBm to -109 dBm
AO-7 input signal at ground with omnidirectional antenna	-106 dBm	-124 dBm to -119 dBm
Noise level at 500 Hz BW**	-129 dBm	-129 dBm
AO-6 Output S/N Ratio	23 dB	15 dB to 20 dB
AO-7 Output S/N Ratio	23 dB	5 dB to 10 dB

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* All path losses include 3 dB polarization mismatch.

**For assumptions see K2QBW paper in 1973 ARRL Technical Symposium Proceedings.

EMERGENCY LOCATION EXPERIMENTS VIA OSCAR

OTTAWA, May 31, 1976 -- The Communications Research Centre (CRC) of the federal Communications Department here has successfully demonstrated the feasibility of a new satellite-aided search and rescue concept that could reduce the time, fuel dollar and other costs associated with conventional methods of finding downed aircraft. The demonstration project is funded by the Department of National Defence.

Recent proof-of-concept experiments employing the Radio Amateur Satellite Corporation (AMSAT) OSCAR-6 satellite and simulated distress singals have shown a relatively low-cost, low-altitude polar orbiting satellite could pinpoint crash sites in Canada and elsewhere in the world to accuracies occasionally as good as one mile, and generally within 5 miles, in as little as 15 to 20 minutes after the spacecraft first "hears" the signal.

It would operate with conventional emergency locater transmitters (ELTs) mandatory for aircraft in Canada and the U.S. Operating on an international distress frequency of 121.5 MHz, the ELT is designed to go off by itself on crash impact and provide a signal for at least 100 hours for search and rescue aircraft to "home in" on. At present, the "home in" range is within about 30 miles of the crash site, usually achieved by flying criss-cross patterns involving many planes and often dozens of costly and sometimes risky flying hours.

The concept CRC has now proven depends on two vital things: highly precise orbit predictions for the satellite (exact knowledge of just where the spacecraft is at any given instant) and sophisticated computer processing of distress signals relayed to a central ground station. It works by measuring the Doppler shift in the frequency of the ELT signal as the satellite passes over the crash. (Doppler effect has been observed by anyone who has ever stood at a railway crossing while a high-speed train approaches, its whistle bellowing. While the sound frequency of the whistle doesn't change, its apparent frequency or pitch is higher while it approaches the listener and lower as it passes and pulls farther away.)

Since May, 1975, when the demonstration project began, the locations of some 60 "crashes" simulated by transmitters at locations as far away as Winnipeg have been fixed by CRC computer processing of signals from Oscar-6 with increasing degrees of accuracy.

Researchers conceive of an operational system that might involve three satellites with a design lifetime of seven to 10 years, with total spacecraft and launch costs of around $30 million. (Over a 10-year period, the $3 million annual cost would be only a small fraction of what Canada spends today on aerial search and rescue.)

As soon as the nearest satellite to a crash location appeared over the horizon visible from that site, it would alert ground stations that it had received an alarm. About 15 minutes later, at the conclusion of its pass, an immediate initial "fix" to within about 70 miles accuracy could be obtained. An optimized position, fixing the crash site to within one to five miles, would be delivered in anywhere from two to 15 minutes later, depending on the capacity of the computer employed.

The satellites would fly at an orbital altitude of about 700 miles -- low enough to get fairly good signals from the low-powered ELTs, yet high enough to cover a sufficiently large swath of Canada (about 2,000 miles wide) with each pass.

Such a system would cover the entire earth and would likely be international in nature. CRC scientists say Canadian industry would be in a good position to build the necessary ground stations for both domestic use and export.

AMSAT GENERAL MEETING

2 MAY 1976

BY GARY TATER, W3HUC

While heavy rains were pouring down AMSAT held a general meeting at the recreational facility of the Goddard Space Flight Center. In spite of the weather, the members enjoyed a steak bar-b-que, an informal program, and lively conversation. Since the Experimenter's Meeting was being held the same weekend, many of the conversations centered around the experimenters and the hardware exhibits that they had brought with them.

The hardware exhibits included the following:

a. Integrated Housekeeping Unit (IHU) as proposed for use on Phase III spacecraft.

b. The W5SXD Microcomputer programmed for several OSCAR satellite applications including orbital calculations, azimuth and elevation calculations and doppler shift corrections.

c. A portaterminal for satellite emergency use built by WA3LND.

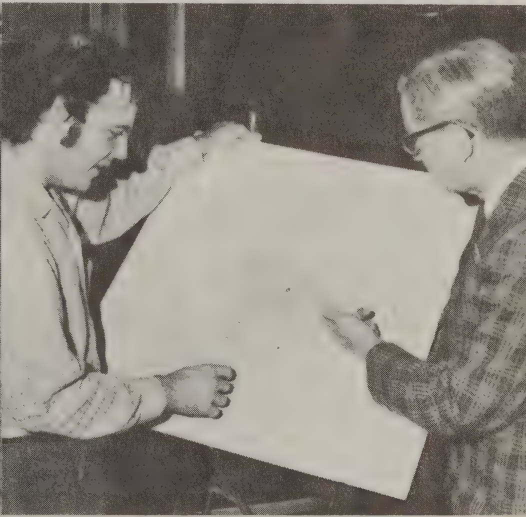
d. The HAL Communications Corp. MCEM-8080 microcomputer.

e. KLM VHF transceivers from TYCOL Communications.

f. An engineering model of the out frame of the Phase III spacecraft.

After dinner Tom Clark (WA3LND) introduced several ARRL representatives Bill Dunkerly (WA2INB), Vic Clark (W4KFC) and Connie Mack (W3SW). Bill Eitel commended AMSAT for its organization, professionalism and ability to meet schedules with a volunteer work force. Bill noted that funding for Phase III was critical and hoped that AMSAT members would help when called upon to support the amateur satellite program financially. Tom also introduced many of the amateurs attending the Experimenter's Meeting including I4SN, DJ4ZC, VE3QB, K6GSJ, K6HIJ, W6BSL and W3GEY. Jan King (W3GEY) summarized the progress of Phase III, pointing out that a lot of progress had been made since the last Experimenter's Meeting but that many technical problems remained. Jan hopes that the vast public service opportunities of the satellites will be exercised.

W3GEY, I4SN and DJ4ZC examine Phase III outer frame. Photo W4ART.



K2UBC and W4FJ examine an elliptical orbit plotter. Photo W4ART.

AMSAT-OSCAR-7 QRP TEST
TELEMETRY REPORT

BY JOHN FOX, W0LER

The QRP test conducted in mid June, 1976, using the AMSAT-OSCAR-7 Communications Satellite was a complete success both from the user and engineering standpoints.

I will present some of my observations as to conditions on board AMSAT-OSCAR-7 as indicated by the telemetry.

All users appeared to adhere to the 10 watt erp level. The mean power output for the three ascending node passes over North America on June 17 was 2.5 watts with a deviation of 1.5 watts. This is a 100% improvement over the standard usage days when OSCAR-7 is under heavy usage. Yet to listen to the output on the passband the signal levels were very good with no apparent degradation.

The battery voltage showed a vast improvement. As shown on the accompanying graph the battery voltage was up 1 to 2 volts over a normal usage day. It only takes one station running high power (excess of 1000 watts ERP) to cause the battery voltage to drop. Several U.S. and Canadians' stations have been observed hitting AMSAT-OSCAR-7 hard enough to cause a 1.5 to 2 volt variation in the battery voltage indicating high power usage probably in the 5000 to 10,000 watt ERP level.

The noise on the neutral ground return (CH-18) was zero for all of the passes monitored during the QRP test except for the last night on the pass over the West coast of the United States when some high level usage was observed causing noise to show up on CH-18. On a normal usage day the noise has been observed to read values up to 1 volt.

Cross Modulation and pumping of the TLM channel were non-existant during the QRP test except on the last night of the test when some stations were hitting OSCAR-7 very hard.

The above comprise a few of the more obvious benefits observed during the QRP test. The test proved that you don't need high power to make solid QSO's using AMSAT-OSCAR-7 mode B. If you have to run more than 100 watts ERP to hear yourself with good readable signals you need to improve either your receiver or your antenna. Signal fades due to propagation are very rare and only occasionally will a fade due to an "E" cloud in the path cause a signal fade. Some fading will be observed when the spacecraft is in the polar regions. Scintillations in the polar region can be very severe but have been almost void from the North polar region since February of 1976 and have reappeared the last week of July 1976.

If you are using a linear polarized antenna for either the up link or the down link you will encounter fades due to polarization changes created by the roll of the spacecraft as it changes attitude in relation to the position to the magnetic poles. You have to remember that the signal transmitted from AMSAT-OSCAR-7 as observed from a fixed point on Earth is not always circular and may at times be either vertical or horizontal linear. For reliable satellite communication a circular polarized antenna for both the up link and the down link is a must,this is especially true for AMSAT-OSCAR-7 mode B.

As we approach winter in the Northern Hemisphere the eclipse of the Earth will be moving North. Whilst AMSAT-OSCAR-7 will be seeing a higher percentage of sunlight per orbit, it will be in the eclipse zone during high usage periods, especially over North America and Europe.

It will be very important that all users of the spacecraft keep their power down to 100 watts ERP or less. The critical time will be from September through to the end of March. As AMSAT-OSCAR-7 gets older and the batteries tend to soften it will only take a few stations running high power to cause the spacecraft to shut down because of low battery voltage. Let's all try to maintain good operating habits and give it a chance and observe the operating parameters established by AMSAT.

ANNOUNCEMENT OF AMSAT ANNUAL MEETING

The eighth AMSAT Annual Meeting will be held at 8:00 p.m. on Saturday, October 23, 1976, at the NASA Goddard Space Flight Center Employee Recreation Center in Greenbelt, Maryland.

In accordance with the AMSAT Bylaws, ballots for the election of three Directors and two alternate Directors will be counted at this meeting. The terms of the following Directors will be expiring as of this meeting: Thomas Clark, WA3LND; William Dunkerley, WA2INB; and Larry Kayser, VE3QB.

The agenda, in addition to the election and regular business, will include:

AMSAT Annual Report
AMSAT Phase III Progress Report
AMSAT-OSCAR 6 and 7 Progress Report
Results of election of Directors

This year there will be an AMSAT Technical Symposium on OSCAR satellites, beginning at 3:00 p.m.

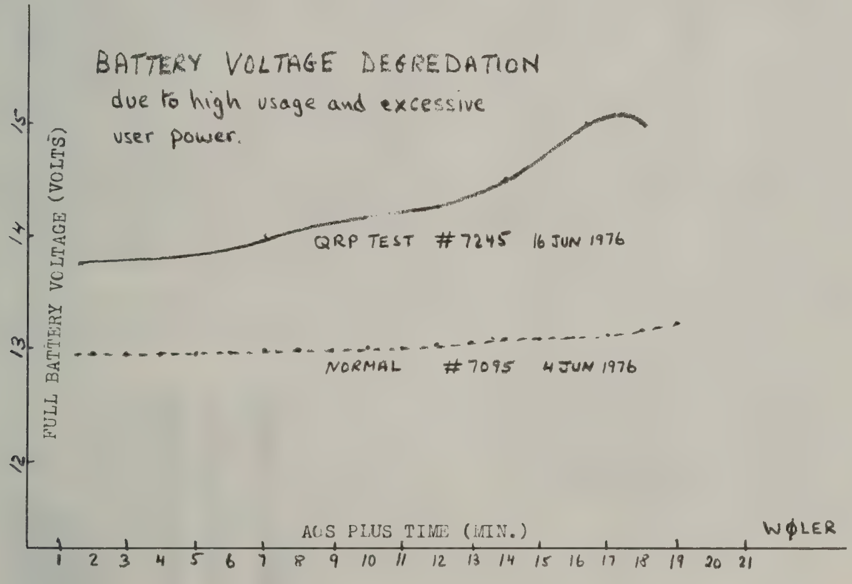
For those coming from out of town, let us know, and we will arrange for you to be hosted by Washington area AMSAT members.

Directions to the NASA Goddard Employee Recreation Center:

Take the Baltimore-Washington Parkway to the Greenbelt Road exit (Rt. 193), and take Greenbelt Road east 1.5 miles to Soil Conservation Road (on the left). Turn left onto Soil Conservation Road and go 0.1 mile to the first open gate you come to on the right. Go through this gate, continue onto the gravel road and then on to the wooden Goddard Recreation Center building.

There will be an AMSAT dinner before the meeting at 6:00 p.m. at the Goddard Employee Recreation Center. Please let us know if you can join us so that we can firm up reservations.

The 146.25/85 AMSAT repeater will be available for talk-in before the dinner and the meeting.



"LETTERS AND COMMENTS"

Dear Joe,

As sole southern hemisphere representative at the planning meetings held for the Phase III spacecraft, perhaps it is time I commented on the views expressed by Gregory Roberts, ZS1BI and others in recent Newsletters.

It would be a great simplification to say that the bias towards the Northern Hemisphere in the orbit totally reflects the self interest of the countries most concerned with the planning and building of the spacecraft, but it is in part true. As has been pointed out to me numerous times in meetings and correspondence over the last two years, more than 60% of the world's amateurs live in the hemispheric band Japan - U.S./Canada - Europe - Northern Russia and it would be unreasonable to expect any organization based almost entirely within these regions to consider placing any satellite in an orbit that does not favour them. However, all is not lost for VK, ZL, ZS, etc., as the Phase III spacecraft will possess no station keeping devices and its apogee must drift, and it can only drift south. Estimates vary as to the time that will elapse before the drift brings the apogee south enough to make it really useful to us but it can only be a matter of time.

It should be borne in mind by 'southerners' that the fact that an elliptical orbit of the type envisaged for the Phase III spacecraft, with an apogee over the South pole, is almost as useless as a North pole apogee, as a quick scan of coverage maps will show. What will happen in the early period of life (providing all goes to plan) is that the satellite will seem to hang just above the northern horizon (as far as VK latitudes are concerned) for hours at a time, with little lateral movement, allowing the use of terrestrial antennas. Perhaps the greatest problem for the odd VK, ZL, etc. working through the satellite at extreme range will be the hassle of being heard through the northern QRM. The VK user of AMSAT-OSCAR-7 who expects Phase III to be similar but with greatly extended range is in for a nasty surprise.

What does not seem to be realized by some correspondents is the launch opportunities available to us. Piggy backs on "Intelsat" launches are out of the question at the present time and even if they were possible, regional difficulties would be much more acute. No doubt Mr. Roberts (ZS1BI) would like to see a geostationary satellite over the Atlantic. VK's, SA's and W6's would want the Pacific, and so on.

On another subject Joe, I would like to express my sympathy with your feelings on the relative economics of the AMSAT dues for non U.S. members. The W and VK standard of living is roughly comparable, what you lose on the swings (land taxes, cost of houses, etc.) we lose on the roundabouts (cost of cars and similar items), but such is not the case for the UK and other countries. The economics of the world market means that being a ham in some countries is confined to the moderately well off, if use of "international" gear (such as the FT101 etc.) is envisaged. In these countries subscriptions to expensive overseas magazines and/or organizations tend to come low on the list of economic priorities. Martin Sweeting, G3YJO, in conversation at the Washington meeting in May suggested a sliding scale of dues for non U.S. members and I think this is a very good idea. The catch is of course that it costs more to send the Newsletter to say a G, than a W, and the 'return' to AMSAT is therefore already less. Now that orbit predictions, etc. are to be published annually perhaps the newsletters need no longer be sent overseas by airmail. With the local posting system used by some of the affiliates (such as in VK) bulk surface post from the U.S. could be a worthwhile saving.

73,

David Hull, VK3ZDH

Dear Joe,

Some comments on the June 76 Newsletter.

It's too small and brief to carry the price of $1.00. Fifty cents would be more in line, even considering the postage rate. The cost I can accept because I enjoy and support the program. I would like to see more articles such as "The Southern Hemisphere Effect" by VK5EU/ VK5ZAD.

I also didn't receive my copy until two items were already outdated. (The two appearing on page 8. ARRL Field Day, and Special Low Power ,QRP, Test.) I don't know whether to blame this on Printing, Distribution, or poor mail service or all three.

Reference "The Southern Hemisphere Effect". I have observed the same effect in reverse to the South of 32°N the signals are weaker. Once the bird has passed overhead and is to the North of me the signals are much better. 80% of my QSO's are to the North. I use a three element HOR beam on 10 M, and a LHCP 2 M array with 100 W. ERP. I thought this might be local conditions but the Field Day 76 experiences gave the same results.

Some comment on the usability of the two birds. OSCAR 6 seems to out perform OSCAR 7 at this location. OSCAR 6 continually has a better downlink and easier access uplink that OSCAR 7. Since the ground equipment is identical the difference must be in the birds themselves.

May 31, '76 I received OSCAR Award #92 at this writing I have 27 states, VE's and countries. Three more for an endorsement to my OSCAR.

Previously I sent a letter, along with my membership, which I thought was quite good for the beginners. Also copies were sent to World Radio News and QST. Both of them replied. World Radio News reprinted the entire letter in their May issue, QST wishes to use parts of the letter in QST, but have not done so to present. However, I have not even heard an acknowledgement from AMSAT.

Like many others I am beginning to wonder if ARRL couldn't handle the Satellite program better than AMSAT seems to be.

WA5DYH
STEVE

(The size of the Newsletter is governed by the availability of material. If material is submitted, it is usually published. The Newsletter performs two functions. It documents events and disseminates information. Thus happenings that occur just at press time may be included. Press time is a function of many things including vacations, business trips, material availability, etc.

Your letter was received but did not call for any comment. With reference to your last paragraph how many and how. -- -- Joe)

Dear Joe,

Sorry for not having dropped you a line earlier thanking AMSAT for having allowed us the use of the Wednesday orbits on OSCAR-7 on the 26th of May, during the 30th Anniversary of Amateur Radio in ZB2 exhibition. I would also like to thank through your column Pat, G3IOR, who made the necessary arrangements with AMSAT to allow us the use of the Wednesday orbits.

A full report is already prepared and at present we are waiting for some photographs to be printed, as soon as they are in our possession we shall be supplying you with the whole story on the exhibition.

Best 73's,
Jimmy, ZB2BL

Dear Joe,

Alaskan receiving conditions on 10 meters are very funny. You never know how good it is going to be. We tried all of Field Day (with two different rigs) to hear the downlink -- but no go. It is just as though we have a great big magnetic shield over the top of us.

News: I will try and be on the air on mode B, by July 10th weekend and that will take care of the problem as the two meter downlink works just great!

73's,
Bill
K7MWC/KL7

Dear Joe,

Prompted by the article from Graham, VK5ZAD (who, incidentally, was nearly responsible for a G3IOR heart siezure when he came back to my CQ on A-O-7 until I spotted the ".../W2" suffix) here are some more comments on the Southern Hemisphere effect.

I noticed this effect soon after the stabilization of OSCAR-7, when it became apparent that whilst the satellite was giving a reasonably good downlink when out to the East and West, and similarly to our North, it was frequently well below the noise when coming up from my SSE on near overhead ascending orbits. On due overhead passes, few or no signals, including the beacon, are readable until A-O-7 has reached some 80° elevation, and thereafter stay consistently good until it reaches the NNW horizon LOS.

At first, I took this to be sporadic E manifesting itself in the South, but after faithful old OSCAR 6 had been copied perfectly well on passage and time related orbits, the theory paled. The dusk/daylight attenuator was suspected, but, on comparison with A-O-6, this too negated the supporting evidence. The presence of some of the ultra-high power users in SE Europe was suspected by extreme ALC upping, but when they were not on, the effect persisted, and (unlike A-O-6), the beacon depression could not be blamed on the irresponsible ethics of the few. The likelihood of polarization reversal was soon dispelled when vertical beams for the downlink were tried, with only minor occasional improvements.

It became even more intriguing when TU2EF, TU2DD, TJ1EZ and CN8HD reported that they had called me and either I had not heard them, or, that I had given them a marginal report when they were hearing both themselves and me at RST 589! My own signal return had been barely over the noise at those times at G3IOR.

The anomaly became a major subject of discussion on the Eu/Africa net and in letters W2BXA said that he had found difficulty in QSO'ing the South American stations, but I5TDJ and OK3CDI reported little difficulty in working the effected orbits to the South. PA0LQ put up vertical as well as horizontal downlink antennae, and wrote up the results of polarization preference over all available orbits. Whilst he found that signals were good on one or the other on all paths except the ones in question, on near overhead ascending orbits, the beacon rarely peaked above 3-4 dB. over the noise, and the deep QSB effect was coincidental on both his horizontal and vertical antennas. Harry said that Arie, TJ1EZ, had reported calling him many times until they established a QSO, and like myself, Harry is more than happy with his receiving situation.

Gradually, by the process of elimination, a picture began to evolve that the satellite, by reason of its magnetic stabilization, was now lined up between the earth's magnetic poles, and probably did a half-turn at the poles giving one complete "topple" each orbit. To confirm this theory, we needed to find a source of RTTY TLM to give the co-ordinates of attitude.

We published the findings in "OSCAR NEWS No. 12" (September 1975) with a suggested experiment for determination of the 10 m. antenna orientation in respect to earth observer, and a contour map of the average mean downlink beacon strengths found within our 2500 mile contact radius. We also requested TLM input.

From a single run that G8CSI sent in, Dave Walland got cracking on his HP55, and early results looked like our theory was justified.

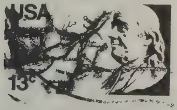
The -Z end of A-O-7 seemed to be North locked, and, if this is so, then those stations 'in-line' with the earth's poles will have the ten-metre antenna end on to them if one takes the dip angle of the field into account and assumes the successful lining up of the satellite into that field. There being no objects to refract and reflect the downcoming signal to any non-linear polarization in space, then we were intercepting the minimum signal from A-O-7 as it came from equator to virtually overhead. From that point on we would start to see the dipole more on the flat, e.g. more coupling, until we lost it as it went North. This theory has held up when observing the satellite on those parts of descending orbits when a similar end-on attitude is apparent, and I have little doubt that a similar effect would manifest itself by the alignment of the permalloy magnets within A-O-7 to the South Magnetic pole relative to VK5ZAD's location. A few reports of this effect from around the world make or break the explanation that I have given.

The only answer is for someone to go up and turn the magnet round by 90° and AMSAT-UK are willing to provide a white coat and a screwdriver if a volunteer can be found with his/her own vehicle.

Perhaps future ten metre downlinks should carry canted turnstiles too! Finally, as regards the polarization optima on the 2 m. end of things on A-O-7 (Graham's point 7), my findings are that rarely is there an optimum circular polarization. Careful graph recordings during many orbits have consistently evidenced the superiority of plane polarization, alternating on a regular roll horizontal to vertical preference, by at least a 6 dB. improvement over 95% of any orbit. This I am at a loss to explain, as regardless of how one views the satellite, one always will be seeing at least two elements at a vector angle equating a circular advantage, although they slowly rotate due to light pressure difference black to white side. I can only assume that ducting layers in the lower atmospheric anomalies give a marked preference effect, but then, it is equally as evident at high elevation angles! Agreed, on the beginning and end of any ascending overhead orbit, one would be seeing the satellite end on, e.g. the turnstile elements all pointing toward one equally, and this would be true until A-O-7 is overhead, when we would then see them progressively more side-on until LOS at horizon, but the preferential for one of either plane polarizations is still serialized.

Again, the answer is to send someone up there to find out just what is happening. It would not take much consideration among some of the users in Europe as to whom we would most like to see orbiting the earth at 920 miles, as there are several high power users without receivers that use A-O-6 on descending orbits, A-O-7 on Wenesdays, etc.... but that's another story!

73,
Pat, G3IOR



Dear Joe,

As we approach the 4th anniversary of AMSAT-OSCAR-6 and the 2nd for AMSAT-OSCAR-7, I would like to congratulate all those involved in the construction and operation and the AMSAT gang on a job well done. The Amateur space program has been a real tribute to Amateur Radio and the capabilities of todays Amateur in pushing forward into new fields requiring advanced technologies and operating habits.

John Fox,
W0LER

Dear Joe,

I noticed that you published my letter in the June '76 Newsletter. I hope that it may provoke some more satellite users to put pen to paper and send in some more info' on this or some of the other "strange" effects. I should like to make one correction, however. In my note 6 you read mirror instead of minor. The effect I noticed in W2 was that when AO-7 passed north of me, the signal strength dropped (as in VK) but that the effect was minimal compared to that noticed in VK. Descending nodes were used in W2 but not with sufficient consistency to allow me to come to any meaningful conclusion about them.

As a member of the South Australian division of WICEN Wireless Institute Civil Emergency Network), I have suggested to the organizors that during some of our future WICEN exercises (practices), we should make use of the OSCAR satellites, and I understand that this suggestion is to be presented at the next committee meeting.

I think the problem of noise/ instability or whatever it is in A-O-7B has probably been raised before, but I will mention it again for what it is worth.

1. Characterized by peaks in transponder noise output every 11 or so (at last check) kHz throughout the pass band.
2. Transponder gain/sensitivity appears to vary across the passband, but peaks do not appear to coincide exactly with noise peaks (only approximately).
3. Effect always appears to be there, but varies in severity from bad to a point where some of the peaks appear to be in open oscillation, ie. characterized by unstable heterodynes in the SSB receiver.

This sounds very much like an effect we have in the Racal RA915 receivers and TRA905 transceivers whereby the filter passband ripple is accentuated by receiver IF/RF regeneration. I hope this and other problems may be identified and eliminated before Phase III is launched.

Many thanks and keep up the good work.

Graham Wiseman,
VK5EU

Dear Joe:

The number of Argentine members has decreased, because it is very difficult to acquire and send dollars and the cost is also prohibitive; the 10 dollars cost about the same as 55 pounds of beef for many roasts, or 15 succulent dinners at a good highway restaurant, and to be sure these are not cheap items. Fortunately things are getting better, but it will take a long time and hard work to restore our economy. -- Also there is the language problem, not everyone has the chance to learn English in school and more than 20 years of English practice by reading QST.

The Southern Hemisphere Effect: was noted here at my 33° South Latitude QTH, but not as pronounced, although long fades are noted in the signals. I think the difference is because the South magnetic pole is at 72° S. Latitude, 155° E. longitude, at 2,000 Kilometers North much about the position of A-O-7 in space (I think that you forgot to publish it), but the picture on the corner of Dec. 74 Newsletter is self-explanatory, the caption says "A-O-7 in orbit over the Southern Hemisphere", I assume that the magnetic axis of OSCAR is parallel to the 10 meter dipole, I think that the down end of the 10 m. dipole points at the magnetic pole. When A-O-7 is south of VK5 it is as if Graham is listening from your table, in the picture, with the 10 m. antenna at right angles to him, when OSCAR goes north it is as if Graham is listening from the lower left corner of the picture, with the dipole end on to him, and we all know what the Hambook says about free space dipole patterns. I think when OSCAR is at the magnetic equator, the dipole will be parallel to the earth surface, but it occurs out of range of VK5 (because the magnetic Equator is in the Philippines 15° North of Equator. Here in South America, the magnetic Equator is in Bolivia 15° South of the Equator.)

Incidentally, for your VHF interest this sinuosity of the magnetic equator was responsible for the very long transequatorial haul when I made the First 6 meter 50 MHz. QSO between Japan and Argentina in 1956 (QST June 56 pag.73), and QSO'd more than 50 Japanese in all JA call areas between 1956 and 1959 on 6 meters.

The evening atenuation in equatorial regions was noted many times and I agree with Graham about ionization, and I think this ionization is responsible for the fact that many times the 10 m. down link was received for short periods of 1 or 2 minutes when OSCAR was 12 to 25 minutes North of Equator.

AMSAT should state if the antenna polarization listed in the Newsletters is correct or not, I think it is correct because A-O-7 has its 2 meter antenna in the upper border when South and in the lower border when North. For stations near the Equator that it may be as VK5EU says.

OSCAR 8 Orbit: I add my voice to the ZS1BI plea for a different orbit. -- Although with your orbit we can work deep into the Norther Hemisphere for 1 or 2 hours in a overhead pass, it will seldom happen because with the 12 hours period the Equator crossings do not progress, if the first orbit crosses at 00.00Z in 0°, the second will cross at 12.00Z in 180°, the third the next day at 00.00Z in 0° and so on.

4 Ft Esztergom MAGYAR POSTA
4 Ft Esztergom MAGYAR POSTA

How to fit all the VHF fanatics of Europe, North America, and Japan into the OSCAR pass band at the same time and for long time? If you have an idea please publish it, I can not imagine one. -- Time shared or power reduction does not work, there will always be pirates, remember what happens in the Northern Hemisphere with the high powers with our present OSCARS.

The Orbit that I Would Like: As the 101° inclination can not be achieved due to the Delta piggy back launch, I think in an orbit with the apogee at the Equator; with this orbit, half the world, say the Atlantic and Indies will revolve below the satellite in one orbit, and the other half say the Pacific in the next, and if the Period is changed by 1 or 2 hours from your 12 hours one, the equatorial crossing will progress and in a week or so it will favor all possibility of DX for every station in the whole world. -- And when a part of the world is eclipsed, more pass band space will be available for the rest. I am sure that this orbit will give very much incentive to the OSCAR work.

EUROPA 0,90 REPUBLIQUE FRANÇAISE
EUROPA 0,90 REPUBLIQUE FRANÇAISE

CORREIO BRASIL 1,00

Possible QSO with Africa: As I am in the west part of Argentina, ZS1BI is more than 600 Km. out of range, but the Buenos Aires area is in range and there is a good group of OSCAR users there, they will try the evening orbits Equator crossing between 30° and 35° (this last just touches my range circle; I listened many timessbut heard nothing) and the morning descending crossing between 15° and 20°. A better possibility for ZS is San Pablo Brasil PY2CSS is very active using both modes. -- For me the only possibility is Liberia (EL), but I think that there is not much activity there.

If anyone would like to try some long distance schedules, please write and arrange one. My address is as follows:

E. C. FONTANA - LU9MA
Patricias Mendocinas 262
5529 - Rodeo Del Medio
MENDOZA, ARGENTINA

73,
Gene, LU9MA

Dear Editor,

It was the biggest flop I've ever had! I do attempt OSCAR contacts from time to time, however, of late it's a flop. -- I am unable to get into OSCAR 6 or 7!! Why? Bad Xmitter? Not so. I am using a Multi 2000 -- to talk to my friends on SSB across the states on 10 watts. Well, maybe antenna! Not so either. Then came the dawn, not enough power. I have fallen into the syndrome of using 10 watts into a 15 dB gain beam and not enough power -- Why in the hell doesn't someone stop the big boys or give them their own toy. This is worse than C.B.

We got excellent PR on Field Day. With a two element 10 meter quad and a four element two meter quad all on the same boom. It was all built in the field out of bamboo and worked great, only it was difficult to tell news media that I needed more power to use the satellite. They were greatly impressed anyway and gave OSCAR a five minute spot on TV. Sure wish I could also use the satellite!

Bob Taylor
WB5LBT, LM-437

Dear Joe,

The CENTRAL DIVISION CONVENTION was a success and the AMSAT booth even more so.

We were able to make 16 contacts on three passes using Mode B even though we had FM rigs all over the place and a high power 6 meter station about 15 feet away.

Sparky, W9KJU, did a wonderful job on his talk on OSCAR, which was attended by about 200 persons.

All three local VHF TV stations had cameramen there and Channel 4 and 12 got tapes of actual contacts being made. Channel 4 presented their tape on the news at 6 PM and 10 PM and Channel 12, their's at 5 PM and 11 PM. Channel 12 spent nearly 45 minutes with us and their tape included an interview with W9KJU and pictures of W9OII tuning the receiver, transmitter, using the key, our antenna turning and even the SWR meter going up down. They also had audio from a SSB to CW (us) contact with W5SLL/0 and mentioned that we had contacted Sweden earlier.

All the hand out material went and I had made over 100 copies each of "What is AMSAT" and membership applications. The telemetry breakdown sheets of which I had made only about 30 copies also were soon gone. Also the same with the pre-amp article by W3TMZ.

My step daughter had made the AMSAT emblem and AMSAT sign in letters nearly two feet high so we were easily identified.

We also displayed awards available to OSCAR users and QSL's from 40 different countries.

My XYL was a great help as we were up at 4 AM and in Milwaukee by 6 AM and set up by 7 AM. Hope we did AMSAT some good.

73,
Keith, W9OII

P.S. CH 12 also showed a close up of the ARRL SATELLITE DX ACHIEVEMENT AWARD and a closeup of the GD3IOR QSL card.

NEWS FROM OVERSEAS

Dear Joe,

Activity over here has recently been very much influenced by the long days and Summer weather, and though interest has not waned, little time has been devoted to OSCAR in recent months.

El6AS went mobile with OSCAR from Co. Cavan using mode B. He really caused a pile up on the morning overhead pass. During the mode B OSCAR QRP tests on 16/17/18th June, Albert made 67 contacts using ½ watt into a 13 dB gain antenna giving an ERP of 10 watts approximately. Some of the QSOs were with W1 to W0 excluding W6. Just goes to show what can be done with QRP even through OSCAR.

Jim Malone (EI4N)

Joe,

The 'African-Area Net' is working very well even though it mainly consists of ZS-stations with ZS1BI always reliably there as well as Dr. Peter, 5Z4JJ of Kilimanjaro. I will Postscript the active African Stations. 9G1LZ, Andy, is especially welcome to OSCAR (Mode A CW), and I hear that 9J2PH (Peter) is in the UK picking up OSCAR equipment. I hope to hear Eric, 5N2ESH soon and I believe he'll soon be back from his UK vacation with a Rig. No news yet from 6W8BR, Roger, but here's hoping!

I've not heard any good W/K signals this year yet here and believe that the fall will be the time again for TU/W QSO's on Mode A. Believe that Mode B TU/W is not possible as I've never heard the US on that mode!

I was very pleased to hear from I5TDJ (on HF) the other day that he had heard ZS6BGQ, Hermann, and I'm sure that this will give the ZS's a 'shot in the arm', because of course down there they are limited very much to other stations out of S. Africa that they can work, with nothing South or East of them, only maximum-range possibilities of S. America (E. Brazil), and the few African stations to their North! (ZE - 5Z - TU - 9X - 5X - 9G, with future possibles of 9J - 5N - EL - 6W8). TJ1EZ is now QRT and back as PA0EZ. FH8CY and A2CJP not heard any more.

Mode B is very definitely waking-up in ZS-land and several of those OM's can be heard with good signals up here, so I look forward to some good QSO's with them. Abidjan is a very good location Country-wise and so far on Mode A I've had the good fortune to work 41 countries with 30 confirmed. Many European Countries have not been worked yet due possibly to low activity in those countries or poor antennas, however they are in range! I wish that many of the European station receiving setups could be improved as so many of them are S 7/8 here and yet they are not hearing their own signals until the OSCAR is close to them.

By the way, ZS1BI has heard 8JIRL (Japanese Antartica) on Mode A and I have heard LU4DYH and KP4ES.

Hugh, TU2EF

COVER STORY:

PRESIDENT FORD HEARD VIA OSCAR

On July 1st, 1976, President Ford opened the new Aeronautics and Space Museum in Washington, D.C. As part of the festivities AMSAT set up a battery operated station on the steps of the museum. The station was put together and operated by Tom Clark, WA3LND, (shown) and others.

The voice of President Ford was tape delayed and transmitted to the satellites about twenty minutes after the President had finished speaking, when AOS took place.

In spite of the poor location W3ZM/3 made several contacts and chalked up another "first" for Amateur Radio.

A SIMPLE VARACTOR TRIPLER FOR THE 70CM BAND

BY MIKE TOOLEY, G8CKT

Reprinted from the UK FM Group (London) Newsletter.

Undoubtedly the easiest way to get on to 70 cms is with the aid of a simple varactor tripler in conjunction with your existing 2 metre rig. Your 70 cm frequency will be three times your 2 metre frequency (eg: 144.05 MHz will produce 432.15 MHz) and although the tripler produces no power gain (in fact usually it produces about 3 dB loss!) it is capable of producing quite a respectable signal on 70 cms in conjunction with some form of gain antenna.

The circuit of the tripler is shown below. The input is matched via a series tuned circuit at 144 MHz and the varactor bias current is set by the 18 K ohm resistor (a compromise value). The idler tuned circuit is L2/VC2 and this operates at 288 MHz in order to circulate current through the diode at this frequency and thus improve the overall efficiency of the tripler circuit. A bandpass output circuit provides selection and filtering of the output frequency at 432 MHz.

Construction is quite straightforward as shown. The unit is enclosed in a standard die-cast box (RS type 993) which is lined with double sided copper laminate in order to provide a good ground plane which may be soldered to.

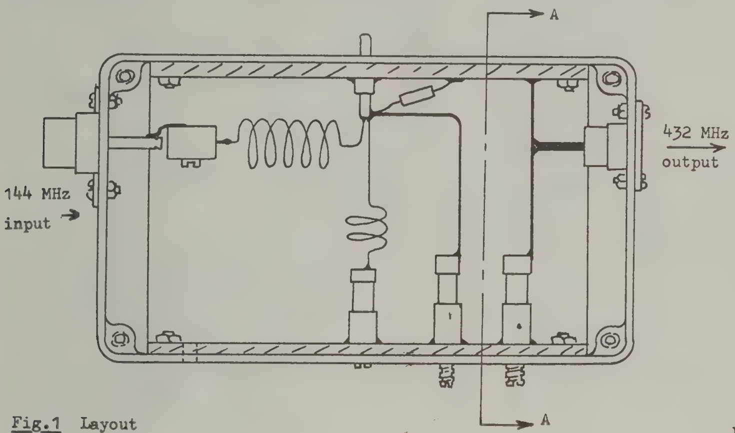


Fig.1 Layout

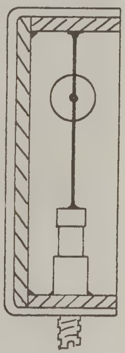
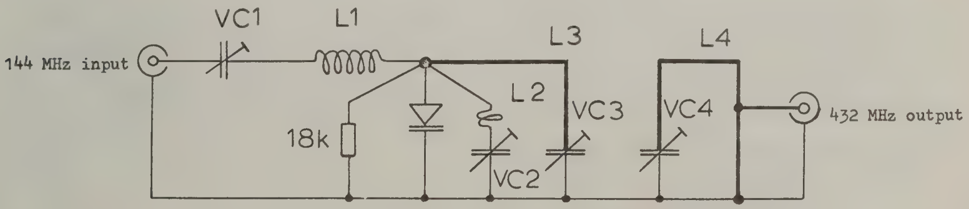


Fig.2 Section A-A

Hints and Tips

If the final of your 2 metre transmitter is fitted with a protection device this may trip when connected to the tripler due to a high VSWR. It may be necessary to adjust VC1 to obviate this whilst observing a VSWR meter in the input feeder. When testing the unit a 1 watt 56 ohm carbon resistor connected inside a standard coax plug is ideal. If the plug has a metal body it will act as a heat sink for short periods. Tuning up the tripler is simple provided that you have a non reactive dummy load, an RF 'sniffer', a wavemeter which is 'good' at 432 MHz and some patience! The tuning of the circuits is accomplished in the sequence; VC1, VC2, VC3, VC4, VC3, VC2. Note that the circuits interact!



series input match / varactor / idler / bandpass output circuit

Fig.3 Circuit Diagram

(Continued on Page 30)

WEATHER PICTURE TEST RESULTS

BY Marciano Righini I4MY

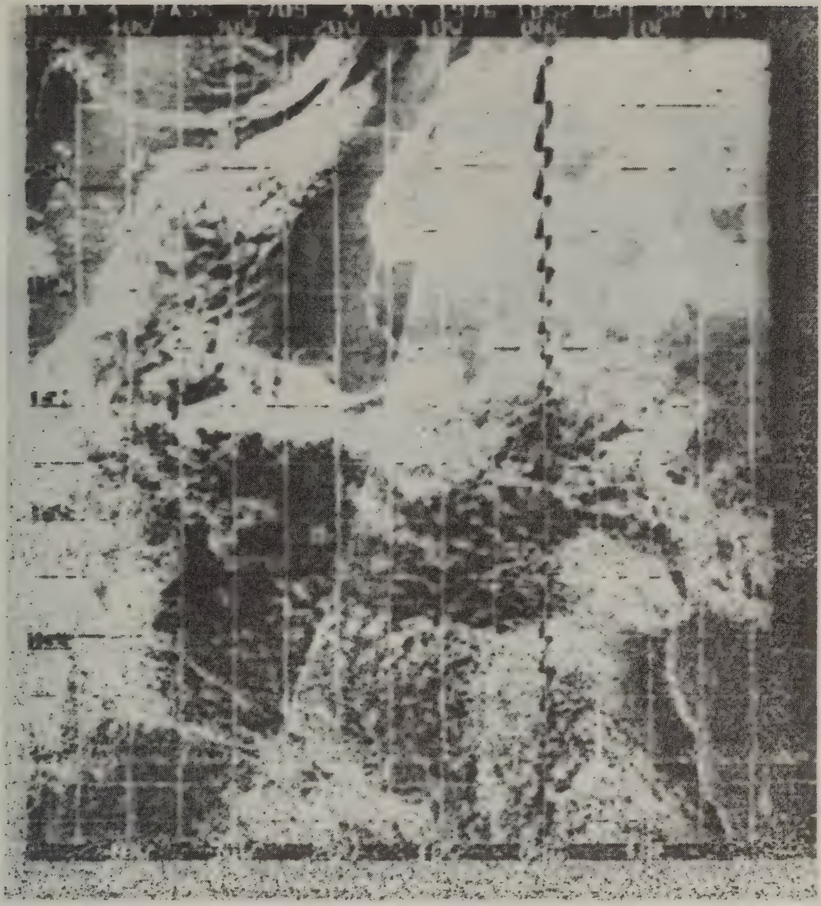
I4GU and myself (I4MY) found the time to receive the weather pictures sent via OSCAR 7 only on May 19, 1976, orbit 6904 by DL0VB. Enclosed, you will find the pictures we could reproduce and details about our receiving equipment.

QTH	Ravenna (Italy)
Date	May 19, 1976
Satellite	OSCAR 7 (Mode B)
Orbit	No. 6904, ascending node 1839 GMT, 330.3°
Receiving equipment	Antenna: 7 element crossed yagi; Az-El mount Receiver: FDK MULTI-2000 Tape recorder: Sanyo MR-910
Facsimile Equipment	Rotating drum display for photographic paper, entirely home-brewed
Reception Report	The signal varied from S1 to S2 for the first 8 minutes, then there was strong and prolonged fading which prevented us from reproducing the last pictures received.
Pictures we could reproduce	1. grey scale 2. picture of NOAA 4 of May 4, 1976 3. part of another picture (we missed the first part of it because of strong fading) 4. fragments of other pictures
Picture quality	Good when the signal is S2 or better; satisfactory when the signal is S1; impossible to reproduce the pictures with a signal below this level.
Remarks	The test was highly satisfactory as OSCAR 7 has proved to be an excellent relay for facsimile pictures. The poor or impossible reception of the signals when the satellite was north of our QTH may be due to the location of the antenna or to bad propagation. We are regular users of OSCAR 6 and OSCAR 7 (mode A and B) in SSB and we have never noticed any severe fading when the satellite is northbound. We have been reproducing pictures from all the USA weather satellites since 1969.

DICK COAN, W3CPU, RETIRES AS AMSAT MEMBERSHIP CHAIRMAN

Dick Coan, W3CPU, AMSAT Membership Chairman for the past several years, has asked to step down from his AMSAT job. Dick, who is retired from the NASA Goddard Space Flight Center, is planning to travel all over the world in the coming years. As Membership Chairman, Dick has been handling all membership renewals, address changes, and additions and deletions of members from the AMSAT mailing list. Bob Balcom, W3PZK, the Assistant Membership Chairman, is taking over the task with the assistance of Larry Martin, W3IBO, and others.

Our thanks to Dick for a job well done!



Weather picture of NOAA 4 transmitted by DL0VB via OSCAR 7 (mode B) on May 19, 1976 received and reproduced by I4MY and I4GU. The picture shows the Atlantic Ocean to the left and Africa to the right.

AMSAT GRATEFULLY ACKNOWLEDGES DONATIONS OF $100.00 OR MORE FROM THE FOLLOWING NEW LIFE MEMBERS

LM-535	Conrad H. Campbell, WB9OML
LM-536	G. Valvassori, IW1AHT
LM-537	Ted R. Vogel, HB9OP
LM-538	John Gallucci, WB8AKU
LM-539	K. J. McLean, VK2ZKL
LM-540	Max Arnold, W4WHN
LM-541	Dr. E. Van Der Smissen, WB5ASA
LM-542	J. A. Fegan, VE3BUL/GW3TTF
LM-543	Edmilson R. do O, PY7CPK
LM-544	H. W. Prendergast, WA1SBN/JR1YDY

MINUTES OF AMSAT BOARD OF DIRECTOR' MEETING

29/30 APRIL 1976

The meeting was called to order at 2015, 29 April 1976, in the Conference Room of Building 2, Goddard Space Flight Center, by President Klein. The following were present:

AMSAT BOD members:

Perry I. Klein, K3JTE	William Dunkerley, WA2INB
Thomas A. Clark, WA3LND	Larry Kayser, VE3QB
Jan A. King, W3GEY	William A. Tynan, W3KMV

Others present:

Lance Ginner, K6GSJ	William Webster, WB2TNC
Richard Kolbly, K6HIJ	David Hull, VK3ZDH
Karl Meinzer, DZ4ZC	George Perrine, W9KOI
Robert J. Carpenter, W3OTC	

The list of those nominated to the Board of Directors was read. The date for the Annual Meeting was set as 23 October, 1976, the Saturday of Veterans Day weekend, at the Goddard Employees Recreation Center. The election to the Board of Directors will take place at that time.

A letter from NASA agreeing to provide a launch for OSCAR-8 was read. There are certain conditions that appear to present no problems, although the subject of allocation of the cost is a point of concern.

There was a discussion of funding. Dunkerley feels that this is really crucial. The ARRL Foundation now has new leaders and has contracted with a professional fund raising organization, which will present a proposed line of action 11 June. There will probably be a kickoff of a fund campaign at the National Convention in July in Denver. There was discussion of a contingency plan to contact special donors for early funds, since meeting the potential NASA launch date will require substantial funds at a time before the ARRL Foundation will realize very much from its campaign. The Foundation appears to have two main objectives for the use of its funds, WARC (save our frequencies) and satellites (in that order).

There was an extended discussion of the possibility of meeting, or failing to meet, the prospective launch data of mid-1977. Three courses of action were discussed: a) tell NASA we can make this launch, b) tell NASA we cannot, c) plan an interim satellite. Meinzer felt that experience tells us that we really need 18 months to get ready from our present status. We should try very hard and wait until November to tell NASA whether we will be able to meet the offered launch, since they do not need to know before then. Clark felt that it is very important to have a continuing program, and we must avoid being without an operating satellite. King mentioned that there are additional launch opportunities for smaller satellites of the size of OSCAR-6 in the next few years. The present Phase III group is not interested in scaling down to this type of project; we should find another group to manage the creation of such a spacecraft. Kayser pointed out that nearly a complete flyable 2 to 10 transponder has been built which could be furnished such a group; he will bring the flight version to the Annual Meeting. Meinzer worried about the diversion of AMSAT management interest between two projects.

Clark moved: Continue support of the Phase III Project for the earliest possible launch (presumably ITOS H). This was approved 6 to 0.

Dunkerley moved: AMSAT actively solicits groups to join in the preparation of an additional satellite for launch in the 1978 time frame to assure continuity of the amateur satellite program. Tynan seconded. This motion passed 6 to 0.

An evaluation of the progress of the Phase III program and the prospects for meeting the ITOS H launch will be made at the Board meeting following the Annual meeting in October.

There was a further extended discussion of the Phase III schedule.

The meeting was adjourned at 2240, 29 April.

(Continued on Page 30)

MINUTES OF THE BOARD OF DIRECTORS MEETING

May 30, 1976

The meeting of the AMSAT Board of Directors (BoD) was called to order at 1415, 30 May, 1976, at the Goddard Space Flight Center, by President Klein. The following were present:

Perry I. Klein, K3JTE
Thomas A. Clark, WA3LND
Jan A. King, W3GEY
William Dunkerley, WA2INB
William A. Tynan, W3KMV
Robert J. Carpenter, W3OTC

There was a discussion of AMSAT participation in conventions, hamfests, and radio club meetings. There are so many requests for representation that Washington-area AMSAT officials do not have enough time to attend, and the travel expenses are a burden on the treasury. It was agreed that an appropriate package of materials would be prepared which could be used by Area Coordinators to staff booths, etc., in the name of AMSAT at most such events. The ARRL will handle the distribution of these kits.

Mr. Tynan introduced the subject of increased material benefits for Life Members. After discussion, Mr. Tynan moved that Life Membership shall bring with it First Class mailing of the AMSAT Newsletter, a pin and/or a plaque, and that a three-year time payment plan be instituted for Life Membership. Mr. King seconded the motion. After further discussion Dr. Clark amended the motion to place the BoD on record in favor of tangible benefits for Life Members, but that further study of the feasibility of implementing first-class mailing and the other aspects would be required with a report at the next BoD meeting. The amended motion passed with no negative votes.

The discussion of the above motion brought up the suggestion by the Assistant Treasurer, Bill Hook, W3QBC, that there be a meeting of the administrative volunteers in AMSAT to resolve certain problems which keep arising. Mr. King and others commented on the need for the meeting. It was decided that Dr. Hook would be urged to set a convenient time and that he, Fred Siebert, Chod Harris, Bob Balcom, and a number of others should attend.

There was a discussion of an AMSAT filing on FCC Docket 20777 which proposes the substitution of bandwidth limitations for explicit emission-type restrictions in each of the amateur bands. The proposed rules do not seem to contemplate wide-band linear transponders such as these used in the AMSAT-OSCAR satellites. Mr. Tynan will prepare a draft of an AMSAT filing.

Mr. King reported on the probable cost to AMSAT of the ITOS-H launch, a result of the cost-sharing clause in the NASA luanch approval. The total AMSAT cost is estimated to be comparable to AMSAT's entire resources. The most expensive part of AMSAT participation in the launch is changes in drawings, which would have to be started very soon. Mr. King feels that we cannot have Phase III ready to fly on ITOS-H. There was a long discussion of the impact of this realization. There are no known suitable later launches until Shuttle in about 1980. Mr. King feels that there is about a 50% chance that either AO-6 or AO-7 will still be operable in 1980. In view of the problematical nature of meeting the ITOS-H launch and the fact that AMSAT's total financial resources would be spent, it was agreed that a letter must be written to NASA within a few weeks informing them of AMSAT's desire to shift to a later launch. It will be written after discussion with ASSC.

There was a discussion of the possibility of offering employment to Jan King, W3GEY, on a full-time basis.

The meeting adjourned at 1845.

Respectfully submitted,

Robert J. Carpenter

(Continued from Page 28)

The meeting was reopened at 2210, 30 April 1976, at the Goddard ERC, to discuss the ground support activities associated with Phase III. Additional persons present were David Hull, VK3ZDH, and George Perrine, W9KOI.

The basic question was as to whether to continue the Australian development of an intelligent-terminal ground support checkout system, or to purchase microprocessor-based CRT terminals for this purpose. After discussions by Hull and Perrine, it became obvious that two distinct applications exist, a complex one for control stations and ground checkout, and a simpler one for sophisticated users. It was decided to encourage the VK group to press forward with the complex terminal for command and checkout use. Commercial terminal manufacturers were encouraged to produce terminals suitable for users to decode the Phase III engineering beacon and similar uses.

The meeting adjourned at 2245, 30 April.

Respectfully submitted,

Robert J. Carpenter

(Continued from Page 11)

Component List

Varactor diode: BAY96 or similar. Inductors, L1-L4 see figure; L1 5 turns 18 swg tinned copper wire ¼" inside diameter L3 and L4 length as per diagram straight wire 16 swg tinned copper. Capacitors: VC1 20pF ceramic, VC2, VC3, VC4, 2 -6 pF tubular piston type soldered in. Note that VC1 is adjusted through a small hole in the side of the die-cast box using a plastic trimming tool.

Specifications

Input and output terminations; standard coaxial connectors. Maximum power input; 20 watts. Typical efficiency; 50 to 60% (depending on drive). Minimum recommended drive; 1 watt. Spurious content; -40 dB typical at 10 watts output.

AMSAT - STICKERS

By special arrangement with SAMCO, Box 203, Wnantskill, N.Y., 12198, we are pleased to announce the availability of labels for use in personalizing QSL cards, stationery, equipment, etc. These labels are approximately 0.75 x 2.25 inches (2 cm x 6 cm) and are imprinted with the AMSAT globe in red and the word AMSAT in blue. They are available printed on either gummed glossy paper (at $0.03 each) or on clear pressure sensitive acetate (at $0.04 each). Sam at SAMCO has kindly agreed to donate part of his profits to AMSAT as the demand warrants.

AMSAT

Sam also is famous for his "Travel-pak" QSL cards which consist of your call on clear acetate for use on the front side of a suitable post-card, and a gummed report form for the rear. He also makes address labels on either gummed paper or acetate.

Orders for the labels should be sent directly to Sam. For an extra $0.25, he will also send a personalized sample of his QSL cards. Be sure to mention AMSAT.

de WA3LND

IF I COULD DO IT, ANYONE CAN

BEGINNERS SERIES

BY STAN BRIGHAM - W3TFA

It was back in September, 1973, when I first tuned over the 10 meter band to see if I could copy signals from the AMSAT-OSCAR-6 spacecraft. I was amazed to hear it so well, especially, since it was the first time I had looked for the "Flying Shoe Box". Two meters has always been my favorite band, but for many reasons I had been off of 144 MHz, since my antennas came down in a severe 80 knot windstorm in 1971. From what I had read no pretentious radiating systems were a prerequisite for working OSCAR so I decided to dust off my SCR - 522 which had been in service since 1947 until the loss of my antennas, and see if it could generate a signal which could penetrate the satellite. I had been operating exclusively c.w. on the bottom 50 KHz of the 144 MHz band for years and all my crystals were below 145 MHz. At the Reston, Virginia, Convention I picked up two FT-243 crystals -- 8105 and 8110 KHz.

A telephone call to my long time friend Ernie White, W3UJG, initiated a check of my uplink frequency on 144 MHz within a half a kHz, and from that it was easy to calculate what the downlink frequency on 29.5 MHz should be. The next step was to establish a skid with Ernie on the most likely orbit he might hear me. We decided an overhead pass might be best since I was using just a horizontal dipole in the room fed by a piece of RG - 58C/U coax cable. The pass came and went, but no contact. A phone call revealed no encouragement from either end. Several passes and about ten days later we heard each other but on different orbits. At least that was somewhat of an improvement because now we knew where to look for one another.

It was on October 29, 1973, on Orbit #4738, after I had been calling W3UJG persistently for several minutes, that I heard K1HTV call me. After four minutes we successfully completed the contact. And to this day I am indebted to Rich for assisting me in culminating my efforts with my first OSCAR-6 QSO. My next contact was not until December 3rd, some five weeks later, with W5VY on Orbit #5176. Both Pat and Rich were seasoned operators with many contacts via the satellite under their belts. Then on 7 January, 1974, W3UJG and I finally established contact on Orbit #5614 at 49°, and for project "overkill", we did it on the following Orbit #5615 at 78.5°, thus, concluding our efforts of nearly four months.

Over two years have passed since my initial QSO via a satellite, and to date my total contacts number 401 with 98 of these on OSCAR-7 Mode A. The set-up remains the same, but the weakest part of the system appears to be the receiving end of the 10 meter downlink -- a 75A4 with just 20 feet of wire strung across the room. The most discouraging aspect of the overall operation is the high noise level in the area in which I live -- only 500 feet from high tension power lines and but a half mile from a Substation.

The June 1974 AMSAT Newsletter on page 21 ran a short story by Bud Schultz, W6CG, reprinted by special permission from the Decoder, the official bulletin of the WR6ACJ Crestline Repeater Organization. The title is "Don't Knock It Unless You've Tried It". It expresses my sentiments exactly. As WA1IGV of Norwood, Mass. wrote me on his QSL card confirming our first QSO, ..."It is like a disease." He is so right, even our meal schedule is per W6PAJ's Orbital Calendar.

I know with a little more power or a small beam, results would be far greater, but somehow it is quite a challenge for a low power enthusist such as myself.

What am I using? A World War II surplus SCR-522 feeding an inside vertical dipole. This provides 8 watts e.r.p. It may be virtually impossible to work 50 states, but little problem for 48. At present I am stranded at 38 states worked, but have six countries and three continents to my credit. Here's hoping the remaining twelve will drift past my 29.480 MHz downlink frequency and I can boast a 50 state WAS via OSCAR with low power. (Editor's Note: Take a listen for him.)

I know it is theoretically possible, but in practice can the satellite's solar cells outlive my patience? Once you've tried it, you'll like it ---- you will become addicted like I have even after 40 years in amateur radio.

MEMBERSHIP RENEWAL NOTICE

AMSAT has end-of-year billing for renewals. Regular memberships expire at the end of the calendar year.

A renewal envelope is included in all copies of this issue of the Newsletter and may be used for renewal of your membership, to make a contribution, to order Orbit Calendars, or to use when applying for a New or Life Membership. Please check your mailing label for accuracy and use the remittance envelope to inform us of any changes.

Expiration Date (Month, Year)	Coding (See form below)	Member No.
12-76	ACEGH	123

A - Hold an amateur license.
B - Do not hold a license.
C - Member of the ARRL.
D - Non-member of ARRL.
E - Will participate actively in AMSAT activities.
F - Do not desire to actively participate.
G - Capabilities lie in technical areas.
H - Capabilities lie in administrative areas.

Life members and those with dues paid up in advance should ignore this notice.

Life member coding is done as above with the LM number in place of the expiration date. A previous regular member number may appear in the right hand column.

AMSAT AREA CO-ORDINATORS

Update to previous listings.

WISCONSIN	Keith Mason, W9OII, 232 Nelson Street, Sharon, WI 53585, (414)736-4428
OHIO	NOTE CHANGE - Dick Drain, WA8YFW, 6730 Alter, Dayton, OH 45424
ALASKA	NOTE CHANGE - Frank G. Pratt, KL7FSE, 7446 East 20th Avenue, Anchorage, Alaska 99504

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